REMARKS

Claim Rejections Under 35 U.S.C. § 102

Claims 1, 3, 4, 5, 12-16, 17, 18, 19, 23, 24, and 25 were rejected under 35 U.S.C. § 102(e) as being anticipated by Park et al. (U.S. Publication 2001/0024860). Applicant respectfully traverses the rejection.

Claims 1 and 18:

The Examiner states that "[w]ith respect to claims 1 and 18, Park et al. teach a aluminum oxide layer having a surface that has silicon or dopant material filled pores or voids. See [0019]." Office Action, page 2, paragraph 3. Applicant respectfully disagrees with the Examiner's statement. Paragraph [0019] of Park et al. teaches the use of "Si+ plasma doping upon the aluminum oxide layer." Furthermore, paragraph [0019] of Park et al. expressly teaches that, as a result of the Si+ doping, "the silicon ions are directly doped into the aluminum oxide layer." (emphasis added.) Claim 1 recites silicon (along with zirconium, hafnium and titanium) as a dopant material, not silicon ions as taught by Park et al.

The Examiner also asserts that "Further with respect to claims 1 and 18, Park et al. further teach all formations of dopant material that extend below the surface are exposed at the surface. See [0019]." Office Action, page 2, paragraph 4. Again, Applicant respectfully disagrees with the Examiner's statement. Paragraph [0014] of Park et al. teaches that "in order to remove metallic vacancies in the aluminum oxide layer 130, silicon ions (Si+) are doped by plasma." Park et al., paragraph [0014], first sentence. Park et al. continues that the silicon ions move into the vacancy sites. Park et al., paragraph [0020]. A plasma doping process will inherently distribute the dopant throughout the aluminum oxide layer. Thus, metallic vacancies not occurring at the surface of the aluminum oxide layer that are acted upon by the silicon ions would not conform to the requirement recited in claim 1 in that there would be formations of dopant material extending below the surface that are not exposed at the surface. See claim 1, (reciting in part "wherein all formations of dopant material that extend below the surface are exposed at the surface.") This distinguishes the method taught by Park et al. and claim 1. Applicant thus submits that claim 1 has been shown to be patentably distinct from Park et al. For at least the same reasons as provided with respect to claim 1, Applicant asserts that claim 18 is also patentably distinct from Park et al.

Claims 3, 4, 5, 12-16, 17, 19, 23, 24, and 25:

Applicant respectfully submits that it has been shown that claims 1 and 18 are patentably distinct from Park et al. and are in condition for allowance. Therefore, claims 3, 4, 5, 12-16 and 17, which are dependent from and further define patentably distinct claim 1, and claims 19, 23, 24 and 25, which are dependent from and further define patentably distinct claim 18, are also believed to be in condition for allowance.

Claims 26, 28-30, 37-40, and 42 were rejected under 35 U.S.C. § 102(e) as being anticipated by Weldon et al. (U.S. Publication 2004/0190215). Applicant respectfully traverses the rejection.

Claim 26:

The Examiner asserts that "with respect to claim 26, Weldon et al. teach a dielectric layer comprising a aluminum oxide layer having dielectric material or titanium oxide embedded pores." Office Action, page 3. Applicant respectfully disagrees with Examiner's position. Weldon et al. makes reference to "impregnating the pores of the ceramic layer with a polymer." Weldon et al., paragraph [0008]. However, claim 26 recites "silicon, zirconium, hafnium and titanium" as dopant materials "embedded in the pores of the aluminum oxide layer." These materials are not polymers.

Furthermore, Weldon et al. expressly teaches away from what is recited in claim 26. Specifically, Weldon et al. teaches that any existing pores remain unfilled. See Weldon et al. (paragraph [0063]: "The randomly orientated pores are desirable to produce tortuous passageways", paragraph [0070]: "The continuous pore pathways formed by the intersection of one or more pores, microcracks, and separated grain boundary regions in the porous plug 200c allow heat transfer gas to flow therethrough," paragraph [0092]: "Thereafter, a layer of ceramic material is deposited over the electrical isolator 200, and a gas flow or gas pressure is maintained in the electrical isolator 200 during deposition of the overlying dielectric layer to prevent plugging of pre-drilled holes or pores of the porous materials."). Weldon et al. teaches that any existing pores be left unfilled or "unplugged." Weldon, paragraph [0092]. This directly contradicts claim 26 which recites a layer with "a second dielectric material embedded in the pores." Applicant submits this distinguishes claim 26 from Weldon et al.

Page 3 of the Office Action states, "Further with respect to claim 26, Park et al. further teach all formations of the dopant material that extend below the surface are exposed at the surface. See [0019]." The list of rejected claims found on page 2 of the Office Action as being anticipated by Park et al. does not include claim 26. Office Action, page 2 ("Claims 1, 3, 4, 5, 12-16, 17, 18, 19, 23, 24 and 25 are rejected..,") Regardless, Applicant contends that claim 26 is patentably distinct from Park et al. for at least the same reasons as presented earlier regarding claims 1 and 18 in that Park et al. expressly teaches away from all formations of dopant material extending below the surface being exposed at the surface.

The Examiner states in the last sentence on page 3 of the Office Action that "with respect to claim 26, Weldon et al. further teach that the dopant material or titanium oxide is not dispersed throughout the aluminum oxide layer." Although claim 26 does not explicitly recite this limitation, Applicant nonetheless disagrees with the Examiner's assertion. Weldon et al. expressly states that its dopant material "is added in a sufficient quantity to provide semiconducting properties to the aluminum oxide dielectric material." Weldon et al., paragraph [0099], second to last sentence. This is in direct contradiction with the Examiner's assertion because semiconducting properties could not be provided to a dielectric material unless the dopant material were dispersed throughout the dielectric material. Applicant contends that Weldon et al. teaches that dopant material is intentionally dispersed throughout an aluminum oxide layer. This teaches away from the limitations of claim 26. See claim 26 (reciting in part, "a second dielectric material embedded in the pores of the aluminum oxide layer . . . formed of a dopant material . . . wherein all formations of dopant material that extend below the surface are exposed at the surface.").

Also with respect to claim 26, the Examiner also asserts that "the product-by-process limitation 'wherein the dopant material is embedded in the pores of the aluminum oxide layer...of an oxide form and nitride form' has not been given patentable weight." Office Action, page 3. However, Applicant contends that these limitations are not product-by-process limitation, but actually define a structure such that the second dielectric material be a dielectric oxide or nitride form of silicon, zirconium, hafnium or titanium, and that any second dielectric material extending below the surface of the aluminum oxide layer be exposed at the surface of the aluminum oxide layer. Thus, Applicant contends there is no basis to refuse to give patentable weight to the limitations recited in claim 26.

Claims 28-30, 37-40 and 42:

Applicant respectfully submits that it has been shown that claim 26 is patentably distinct from Weldon et al. and is in condition for allowance. Because claims 28-30, 37-40 and 42 are dependent from and further define patentably distinct claims 26, these claims are also believed to be in condition for allowance.

Claim Rejections Under 35 U.S.C. § 103

Claims 6-7, 8-11, 20, 21, and 22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Park et al. Applicant respectfully submits that claims 1 and 18 have been shown to be patentably distinct from Park et al. and that claims 1 and 18 are in condition for allowance. (See previous discussion.) The taking of official notice regarding the ranges for packing density or ranges of dopant material weight fail to overcome the deficiencies of the Park et al. reference with respect to claims 1 and 18. Therefore, claims 6-7 and 8-11 which are dependent from and further define patentably distinct claim 1, and claims 20, 21 and 22, which are dependent from and further define patentably distinct claim 18, are also believed to be in condition for allowance.

Claims 31-32, 33-36, 41 and 43-45 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Weldon et al. Applicant respectfully submits that claim 26 has also been shown to be patentably distinct from Weldon et al. and is in condition for allowance. (See previous discussion.) The taking of official notice regarding the ranges for packing density, ranges of dopant material weight, process limitations or uses of dielectric materials fail to overcome the deficiencies of the Weldon et al. reference with respect to claim 26. Therefore, claims 31-32, 33-36, 41 and 43-45, which are dependent from and further define patentably distinct claim 26 are also believed to be in condition for allowance.

Allowable Subject Matter

Applicant acknowledges that the Office Action indicated claims 2, 27 and 88-107 as being allowed.

CONCLUSION

Claims 1-45 and 88-107 are pending.

In view of the above remarks, Applicant believes that all pending claims are in condition for allowance and respectfully requests a Notice of Allowance be issued in this case. Please charge any further fees deemed necessary or credit any overpayment to Deposit Account No. 501373.

If the Examiner has any questions or concerns regarding this application, please contact the undersigned at (612) 312-2204.

Respectfully submitted,

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